

# Robot-Mediated Interviews: Does a robotic interviewer impact question difficulty and information recovery?

Luke Jai Wood, Kerstin Dautenhahn, Hagen Lehmann, Ben Robins, Austen Rainer,  
Dag Sverre Syrdal

*Adaptive Systems Research Group, University of Hertfordshire, United Kingdom*

**Abstract.** Our previous research has shown that children respond to a robotic interviewer very similar compared to a human interviewer, pointing towards the prospect of using robot-mediated interviews in situations where human interviewers face certain challenges. This follow-up study investigated how 20 children (aged between 7 and 9) respond to questions of varying difficulty from a robotic interviewer compared to a human interviewer. Each child participated in two interviews, one with an adult and one with a humanoid robot called KASPAR, the main questions in these interviews focused on the theme of pets and animals. After each interview the children were asked to rate the difficulty of the questions and particular aspects of the experience. Measures include the behavioural coding of the children's behaviour during the interviews, the transcripts of what the children said and questionnaire data. The results from quantitative data analysis reveal that the children interacted with KASPAR in a very similar manner to how they interacted with the human interviewer, and provided both interviewers with similar information and amounts of information regardless of question difficulty.

**Keywords.** Humanoid robots, interviews, children, human-robot interaction, disclosure, interaction dynamics, social interaction

## 1. Introduction and Background

In recent years research exploring potential applications for social robots has increased, from entertainment and educational aids [1-4] to therapeutic and assistive tools [5-7]. Recent studies have explored the possibility of using social robots to recover information from young children [8-10]. When police officers are conducting interviews with young children that have been through a stressful or traumatic ordeal it can be difficult for the interviewer to maintain their composure without subtly and unintentionally indicating their thoughts and feelings despite their extensive training. The information that a child reveals in an interview can sometimes be quite shocking or surprising. The document referred to by UK police officers states “the interviewer should not display surprise at information as this could be taken as a sign that the information is incorrect” [11] p196. Maintaining such emotional discipline can be quite difficult for a human interviewer but would be easy for a humanoid robot whose expressions are explicitly controlled. It is also important that an interviewer does not appear to assume that someone is guilty “So far as possible, the interview should be

conducted in a ‘neutral’ atmosphere, with the interviewer taking care not to assume, or appear to assume, the guilt of an individual whose alleged conduct may be the subject of the interview” [11] p66. Using a robot to interview a person could eliminate any of the subtle unintentional signs in body language that a human interviewer may give away, as the body language of the robot can be fully and precisely controlled by the interviewer. In addition a person’s perceived authority can sometimes have an effect on a witness, particularly with regards to suggestibility [11] p56. Using a robot could address this problem because the robot is clearly not an adult and may not be viewed in the same way.

In this article we build on and extend our previous research which showed that children interacted with KASPAR very similar to how they interacted with a human interviewer [9]. However, our previous work did not control for the difficulty of the questions being asked, which may or may not influence how children respond to human or robotic interviewers. The article reports on results from a follow-up study investigating how the difficulty of the questions affects the interaction and the information that the child reveal to a robot compared to a human. When children are being interviewed it is often for a very good reason and some of the questions that they may be asked could be quite difficult for them to answer. Therefore, ascertaining how children respond to different types of question, and more difficult questions, is an important step in establishing if robots could be a useful tool for mediating interviews with young children. Exploring the possibility of robot-mediated interviews may reveal whether robotic interviewers could be a valid addition to existing methods of interviewing children by professional staff such as police or social services. The overall goal of our research is to provide professionals with a robotic tool that can be precisely controlled and used as an interface to interview children in an enjoyable and comfortable manner, rather than replacing human interviewers.

## **2. Method**

This study was conducted in a primary school in Hertfordshire (UK) with 23 children, 20 (8 male, 12 female) of which produced useable data<sup>1</sup>. The children were aged between 7 and 9 with an average age of 8 years 10 months and had not interacted with KASPAR before. The robot used was a small child-sized humanoid robot called KASPAR (Figure 1). KASPAR has a proven track record working alongside typically developing children [12, 13], and children with special needs [5, 7].

The interviews took place in an unused classroom that contained a small lockable cupboard that the children could not see into, which was used as a control room for KASPAR. A monitor with a wireless connection to camera #1 was used to observe the situation and make KASPAR respond appropriately (see Figure 2). The interviews were always led by the lead investigator either in person or remotely via KASPAR to maintain consistency between the interviews. The children were unaware that KASPAR was being controlled by a human triggering the correct questions and responses from a pre-recorded list. A second research assistant unknown to the children took the children to and from the interviews and remained in the room during the interviews, but was as non-reactive as possible. Immediately after each interview the children were asked by the research assistant to rate the difficulty of the questions they had just been asked along with other details about the interview.

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<sup>1</sup> Due to technical difficulties and attendance three of the sessions were not included.



Figure 1. KASPAR Robot.

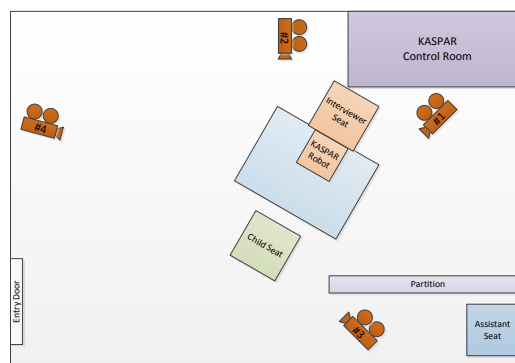


Figure 2. Room layout.

### 3. Procedure, Interview questions and Questionnaires

The interviews were conducted on three days over a two-week period using a two-phase counterbalancing method. Each child experienced two interviews, one with KASPAR and one with a human experimenter, a week apart<sup>2</sup>. The same interview structure was followed on both occasions to ensure comparability. The interviews began with a short introduction and some simple rapport building questions that would establish the child's name, age and whether they have any siblings. This was followed by a question asking the children if they had, or would like pets, in preparation for the main topic of pets and animals. The majority of questions were open questions or were followed by a descriptive question to encourage the children to elaborate on the details to maximise their freedom to express themselves. Research and practice indicates that the most detailed and reliable answers are secured from open questions [14] p27. The interviews concluded by thanking the child for their time and participation. To compare the two different conditions we adhered to a rigid structure with pre-defined utterances. The structure and questions for the interviews were derived from the guidance of a document used by the UK police called Achieving Best Evidence (ABE), a recognised standard approach to interviewing children [14].

The main interview questions were specifically designed to vary in difficulty because we sought to investigate if the children's responses to a robot would differ to their responses to a human when faced with questions of varying difficulty. To ensure that the questions were appropriate and at a suitable level for the children, their class teacher rated a selection of questions. From the list of questions 10 were selected to be used in the interviews as they represented a range of levels of difficulty. In addition, the children were asked to rate the difficulty of the questions at the end of the interview. This was particularly useful because each child is different. For example, if one child had recently visited a zoo it is likely that they may find some questions easier than another child that has not visited the zoo. Also, a child that is only just 8 years old may find some questions more difficult than a child that is 9 and a half years old.

<sup>2</sup> There were five exceptions due to late consent form submission, these children had their interviews one day apart. The results from these sessions were consistent with the data from the rest of the study and were therefore included in our final dataset.

#### 4. Measurements

The primary sources of data for measurement in this study were:

**Questionnaires** - Immediately after each interview the child was asked to rate the difficulty of the 10 main interview questions as easy, medium or hard to answer, and their opinions of the interview experience. The difficulty measure allowed us to assess if the question difficulty was affected by the interviewer, whilst the general interview experience questions assessed how interesting they found the experience, how difficult they found the interview, how much fun they had participating, and how long they thought the interview took.

**Communicative content** - All of the interviews were fully transcribed then analysed in detail for word counts, filler word counts, keyword counts and key point counts. The word counts were the words spoken throughout the duration of the interview excluding filler words. The filler word count was the amount of filler words the children used (e.g. “err”, “errm”, “hum”). The keyword count was the total number of keywords the children used, these related to the questions the children were asked. The key point count related to the content of what the children were saying. A key point was defined as a specific piece of information that we recovered from the child relating to the question they had been asked. Some of these categories were also analysed proportionately.

**Video coded data** - The video data was collected from four cameras recording the interviews. Cameras #1 and #2 were behind the interviewer to the left and right of the interviewer to capture the eye gaze of the children (see Figure 2). The video data was coded using the Observer XT software to measure the various durations of the interview. The durations we measured were interview duration, child response duration, child pause duration, interviewer response duration, response time child > interviewer, response time interviewer > child, eye gaze duration. These measures allowed us to analyse the temporal aspects of the interviews.

#### 5. Results

Results in Table 1 revealed that the most significant differences related to how interesting the children found the activity and how difficult they found talking to the interviewer. The children found the activity more interesting with KASPAR but they also found it harder. The other statistical differences relate to the behavior of the interviewer rather than the children. The human interviewer used more words and spoke for longer, but responded to the children more quickly. Overall there were no differences in the amount of information the children revealed or the amount of eye contact towards the interviewers. Proportionately the children used more keywords with KASPAR than with the human interviewer. The children found that the questions varied in difficulty and overall rated 4 questions as easy, 3 as medium and 3 as difficult. This indicates that we were successful in designing a study with a range of question difficulties. The interviewer did not influence the perceived difficulty of the questions, and overall there were no differences between KASPAR and the human interviewer.

**Table 1.** Results of measures

Measure	KASPAR Mean	Human Mean	Mean Diff.	t(p)	Standard Dev.
Question difficulty	1.72	1.74	-0.02	0.53 (0.601)	0.743
1=boring - 5=interesting	4.18	3.40	0.78	3.44 (0.003)*	0.980
1=hard - 5=easy	3.40	4.08	-0.68	2.29 (0.034)*	1.090
1=no fun - 5=fun	3.80	3.60	0.20	0.89 (0.385)	1.077
1=long time - 5=quick	3.65	3.65	0.00	0.00 (1.000)	1.085
Overall key points	32.60	35.90	-3.30	1.90 (0.072)	10.222
All Key words	33.70	37.40	-3.70	1.48 (0.157)	14.306
Proportionate all key words	0.16	0.14	0.02	2.17 (0.043)*	0.043
Child word count	241.30	308.05	-66.75	2.03 (0.056)	158.647
Proportionate word count	1.61	1.74	-0.12	0.63 (0.539)	0.965
Proportionate filler word count	0.04	0.03	0.00	1.02 (0.321)	0.026
Interviewer word count	150.40	180.00	-29.60	11.3 (0.000)*	17.272
Interview duration	359.92	338.82	21.10	1.03 (0.314)	76.079
Child response duration	139.46	167.19	-27.72	1.88 (0.075)	75.184
Interviewer response duration	52.43	66.34	-13.91	8.84 (0.000)*	8.566
Response time Child > Interviewer	89.20	27.94	61.26	9.27 (0.000)*	36.410
Response time Interviewer > Child	32.66	32.73	-0.07	0.02 (0.987)	16.161
Child pause duration	37.46	39.22	-1.76	0.31 (0.764)	23.198
Total Eye Gaze duration	110.76	98.39	12.38	1.59 (0.128)	36.422
Proportionate Eye Gaze duration	0.32	0.31	0.00	0.27 (0.791)	0.124

## 6. Discussion

Our findings confirm that the questions presented to the children varied in difficulty with an even distribution of easy, medium and hard questions. The results suggest KASPAR neither positively nor negatively influences the behavior or information the children provide. Furthermore how difficult the children found the questions did not vary between interviewers. These results support to our previous work on robot-mediated interviews [9]. The most significant differences were how interesting the children found the activity and how difficult they found speaking to the interviewer. The children found the activity more fun with the robot, which is to be expected because talking to a robot is more novel than talking to a human. However, the children found talking to the robot more difficult, we believe that was due to the robots text to speech synthesised voice. Although no statistical differences in the information the children provided were found, there was a significant difference in the amount of keywords the children used in proportion to how many words they use in total. This could indicate that the information the children disclose was more refined and focused on the particular topic of interest. The statistical results relating to the interviewers were due to speech disfluencies from the human interviewer (e.g., adding words and saying words twice), and constraints of the robot (finding the correct response key).

## 7. Conclusion and Future work

The results from this study are consistent with the findings of our previous research [8, 9], and indicate that children were willing to interact with a robot in an interview scenario and did so in a similar way to how they interacted with a human interviewer regardless of question difficulty. These results continue to support our hypothesis that humanoid robots such as KASPAR could be useful tools for

interviewing young children<sup>3</sup>. Children responded to both easy and difficult questions from a robotic and a human interview in a similar manner. Further research needs to be conducted to investigate if the responses of children vary more when they have a vested interest in keeping information from the interviewer or when they are asked questions of a more sensitive nature. Our next step will be to enhance the capabilities of KASPAR to increase the flexibility of the system rather than having pre-set questions. Developing a user friendly adaptive system is an important step in enabling professional interviewers, rather than researchers, to utilise the system, which is our goal for future work. The feedback from professional interviewers can then be used to establish if robot-mediated interviews could be used for real world applications such as police or social services' investigations.

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